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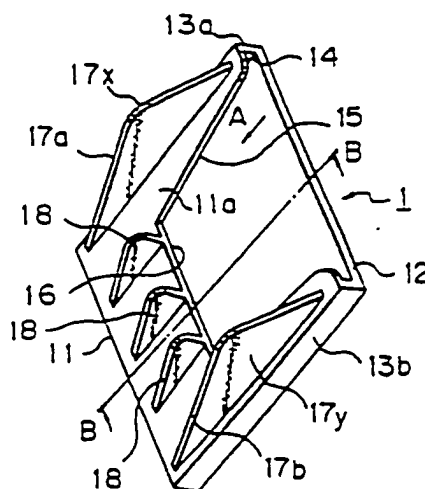
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Venner Shipley & Co. 368 City Road
London EC1V 2QA(GB)(54) **STACKER HAVING PAPER FEEDING FUNCTION.**

(57) In a stacker having a paper feeding function to be used in a printer which uses cut sheets as printing paper sheets and has a manual paper feed function, a slit paper feeding groove (14) is formed of a front plate (11), a rear plate (12), and side plates (13a, 13b) on both sides of the front and rear plates, a sheet guide inclining upward with respect to the discharge direction of the printed sheet is erected on the upper surface (11a) of the front plate (11) and an opening (16) for manual insertion is formed by cutting away the upper part of the front plate (11) so that paper feeding by hand may not be prevented by printed cut sheets received in the stacker or short cut sheets can be inserted by hand.

Fig. 1

SHEET STACKER HAVING SHEET-FEED FUNCTION

TECHNICAL FIELD

The present invention relates to a sheet stacker for use in combination with a printer to hold printing cut sheets, having a hand-feed function.

BACKGROUND ART

A known printer is provided with an automatic cut sheet feeder, a printing unit, and a stacker disposed between the automatic cut sheet feeder and the printing unit to hold printed cut sheet, and allows feeding cut sheets by hand through a space behind the stacker to the printing unit. Japanese Patent Publication No. 63-53091 discloses a hand-feed construction having a fixed hand-feed chute formed by forming a slit between the backside and bottom of a stacker and capable of enabling hand feed when necessary. The hand-feed chute of this known hand-feed construction is blocked up by a printed cut sheet delivered to the stacker after printing, and hence the printed cut sheet blocking up the hand-feed chute must be removed in feeding a cut sheet by hand.

U.S. Pat. No. 4,253,652 discloses a sheet feeder intended to prevent blocking up the hand-feed chute by a printed cut sheet. This sheet feeder has a hand-feed chute formed of the rear wall of a stacker and a guide plate disposed behind the stacker, and an auxiliary inserter is attached to the funnel-shaped hand-feed chute when necessary. The rear wall of the stacker has a sufficiently large height to prevent a printed cut sheet blocking

up the hand-feed chute, and the rear wall of the stacker and the guide plate are disposed so as to form the hand-feed chute in the shape of a funnel. Since the inlet of the hand-feed chute is remote from the printing unit and the inlet is narrow, it is impossible to feed a cut sheet to the printing unit by holding the cut sheet when the cut sheet is short. Therefore, the cut sheet is dropped through the inlet into the hand-feed chute. However, when the cut sheet is curled or charged with static electricity, the leading edge of the cut sheet is unable to reach the printing unit properly, causing jamming to make printing impossible.

It is an object of the present invention to provide a stacker having a hand-feed function ensuring the hand-feed of a cut sheet to the printing unit regardless of the length of the cut sheet without being obstructed by a printed cut sheet held therein.

DISCLOSURE OF THE INVENTIOIN

In one aspect of the present invention, a stacker having a hand-feed function disposed between a printing unit and an automatic sheet feeder to hold printed cut sheets has a flat hand-feed chute formed of a front plate, the upper portion of the front plate being cut to form a hand-feed recess communicating with the hand-feed chute, a back plate and side plates, and sheet guides inclined upward with respect to the direction of delivery of printed cut sheets and attached to the upper surface of the front plate.

The stacker having a hand-feed function thus constructed guides printed cut sheets along the sheet guides to stack up the printed cut sheets, and hence a space is formed between the front

plate and the printed cut sheets to allow the hand feed of a cut sheet through the hand-feed chute without being obstructed by the printed cut sheets. Accordingly, printing efficiency is not reduced and printing facility is improved remarkably.

The hand-feed recess formed by cutting the upper portion of the front plate reduces the distance between the hand-feed recess and the printing unit and hence the leading edge of a cut sheet can surely be inserted in the printing unit by hand regardless of the length of the cut sheet. Since the cut sheet can properly be inserted in the printing unit by hand, print quality is not deteriorated and maintenance work is facilitated.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a stacker having a hand-feed function in a preferred embodiment according to the present invention;

Figure 2 is a fragmentary side elevation of the printing mechanism of a printer combined with the stacker having a hand-feed function in accordance with the present invention;

Figure 3 is a fragmentary perspective view of the mounting unit of a stacker having a hand-feed function; and

Figure 4 is a perspective view of a modification of the stacker having a hand-feed function.

BEST MODE FOR CARRYING OUT THE INVENTION

The present invention will be described in further detail with reference to the accompanying drawings.

Fig. 1 is a perspective view of a stacker having a hand-feed function in a preferred embodiment according to the present invention. The stacker 1 having a hand-feed function has a flat

hand-feed chute 14 formed by placing a front plate 11 and a back plate 12 with a predetermined distance therebetween and attaching side plates 13 to the opposite lateral ends of the front plate 11 and the back plate 12. An upper portion of the front plate 11 is cut to form a recess 15 serving as a hand-feed opening 16.

Side sheet guides 17x and 17y each having an inclined side inclined upward with respect to the direction of delivery of a printed cut sheet are disposed respectively near the opposite sides of the upper surface 11a of the front plate 11. Intermediate sheet guides 18 each having an inclined side having the same inclination as that of the inclined sides of the side sheet guides 17x and 17y are arranged on the upper surface 11a of the front plate 11 between the side sheet guides 17x and 17y. The distance between the side sheet guides 17x and 17y corresponds to the width of cut sheets to be used by the printer.

The stacker 1 having a hand-feed function of such a construction is formed integrally of a synthetic resin or the like.

The sheet guides 17x, 17y and 18 may be substituted by guide members 42 and 43 formed by bending a metallic or resin wire in the external shapes of the sheet guides 17x, 17y and 18, and inserted the extremities of the guide members 42 and into the upper surface 11a of the front plate 11, or fastened to the upper surface 11a of the front plate 11 by screwing the extremities of the guide members 42 and 43 on the interior surface of the front plate 11. Fig. 2 shows the printing mechanism of a printer equipped with the stacker having a hand-feed function in accordance with the present invention, in which the side plates, gears, motor, belts and stacker mounting members of the printer are omitted so that the essential portions of the printing

mechanism may readily be understood, and view of the stacker 1 having a hand-feed function corresponds to a cross section taken on line B-B in Fig. 1. Fig. 3 is a fragmentary perspective view showing the side plate and the stacker mounting members, which are omitted in Fig. 2, in which the right-hand half of the stacker 1 and the right-hand side plate are omitted because the stacker 1 is symmetrical and the right-hand and left-hand side plates are disposed symmetrically with respect to the center line of the printer. The members and portions on the right-hand side will be denoted by the reference characters denoting those shown in Fig. 3. Referring to Fig. 2, the printing mechanism consists of the stacker 1 having a hand-feed function, an automatic sheet feeder 2 and a printing unit 3. The stacker 1 having a hand-feed function is disposed between the automatic sheet feeder 2 and the printing unit 3. As shown in Fig. 3, the platen 31 of the printing unit 3 is journaled in bushes 39 on the side frames 40 of the printer. A support member 38 rotatably holding the bushes 39 as shown in Fig. 2 is fastened to side plates 36 by welding or screwing. As shown in Fig. 2, the stacker 1 having a hand-feed function and the automatic sheet feeder 2 are mounted on the side plates 36 in that order from the side of the platen 31 backward. The support member 38 is fastened at its opposite ends to the side plates 36 to stabilize the side plates 36 and to receive the lower edges of printed cut sheets thereon. Stacker mounting members 37 are provided on the rear side of the support member 38 and are fastened to the side plates 36 by welding or the like. The stacker mounting members 37 are formed by bending a sheet metal. Each stacker mounting member 37 has guide walls 37b and 37c slidable mating respectively with the back surface and front surface of the stacker 1, a bottom wall 37d on which

the stacker 1 having a hand-feed function is seated, and a fixing wall 37a fastened to the side plate 36 by fastening means as welding. The automatic sheet feeder 2 has a pick up roller 22 (Fig. 2) journaled on the side plates 36, and a sheet feed unit 21 mounted on mounting members similar to the stacker mounting members 37. Pinch rollers 33, a stacker roller 34 and stacker pinch rollers 35 shown in Fig. 2 are journaled on the side plates 36. A support member 41 is extended between the lower rear portions of the side plates 36 to stabilize the side plates 36. The opposite ends of the support member 41 penetrating the side plates 36 rest respectively on the upper sides 40a of the side plates 40 of the printer. Thus, the support members 38 and 41 rest on the side plate 40 of the printer when the side plates 36 are mounted on the printer.

The automatic sheet feeder 2 holds a plurality of cut sheets P_x therein. The cut sheets P_x is fed one at a time by the pickup roller 22 and fingers 23 of the sheet feed unit 21. A cut sheet P_x fed through a sheet feed gap 24 is guided by a guide plate 25 to a sheet insertion gap 26. In the sheet insertion gap 26, the leading edge of the cut sheet P_x is advanced to the platen 31 by the pinch rollers 33 so that the cut sheet P_x may wrap around the platen 31. The platen 31 is rotated synchronously with the pickup roller 22 through gears, belts, chains or the like. The cut sheet P_x is printed through the ink ribbon 32a by the print head 32, line by line. After a line is completed, the cut sheet P_x is advanced by rotating the platen 31. Then, another line is printed. After the completion of printing on the cut sheet P_x , the printed cut sheet P_y is delivered toward the front plate 11 of the stacker 1 having a hand-feed function by the stacker roller 34 and the stacker pinch rollers 35. After the printed

cut sheet P_y has been discharged from the printing unit, the next cut sheet P_x is fed to the platen 31 and is wound around the platen 31. Then, the same printing cycle is executed. The printed cut sheets P_y delivered to the stacker 1 are stacked in a pile on the respective inclined sides 17a and 17b of the pair of side sheet guides 17x and 17y. Therefore, a space 19 is formed between the pile of the printed cut sheets P_y and the front plate 11, hence between the pile of the printed cut sheets P_y and the hand-feed opening 16.

When it is desired to subject a cut sheet P_z having a size and a shape different from those of the cut sheet P_x to printing in the printing unit 3, the cut sheet P_z can be inserted by hand through the space 19 in the hand-feed opening 16. Since the space 19 has a thickness corresponding to the height of the side sheet guides 17x and 17y, the cut sheet P_z can easily be inserted in the hand-feed opening 16 by hand so that the leading edge of the hand-fed cut sheet P_z is surely pinched between the platen 31 and the pinch rollers 33 and is surely fed through the hand-feed chute 14 even if the hand-fed cut sheet P_z is curled or charged with static electricity or the hand-fed cut sheet P_z is as thick as an envelop. The hand-fed cut sheet P_z , similarly to the cut sheet P_x , is wound around the platen 31, is printed with the printing head 32, and is delivered as a printed cut sheet P_y onto the side sheet guides 17x and 17y or onto the intermediate sheet guides 18.

In case the hand-feed chute 14 is clogged with the hand-fed cut sheet P_z , the hand-fed cut sheet P_z can readily be removed because the distance between the hand-feed opening 16 and the printing unit 3 is short.

Thus, the stacker having a sheet feed function in accordance

with the present invention incorporated into the printing mechanism enables printing on a hand-fed cut sheet in a continuous printing process in which cut sheets are fed automatically.

CAPABILITY OF EXPLOITATION IN INDUSTRY

As is apparent from the foregoing description, a stacker having a sheet feed function in accordance with the present invention is used in combination with a printer which uses cut sheets and is able to operate in a hand-feed mode. The stacker is disposed between an automatic sheet feeder storing a plurality of cut sheets and a printing unit. When it is desired to hand-feed a cut sheet during printing operation in which cut sheets are fed automatically by the automatic sheet feeder, the automatic sheet feed operation is interrupted and a cut sheet is fed through a space behind the stacker.

1. A stacker having a hand-feed function disposed between the printing unit and automatic sheet feeder of a printer to store printed cut sheets, comprising:

a flat hand-feed chute formed of a front plate, a back plate, and opposite side plates; and

sheet guide members each having an inclined side inclined upward with respect to the direction of delivery of printed cut sheets and set upright on the upper surface of the front plate;

characterized in that an upper portion of the front plate is cut to form a hand-feed opening communicating with the interior of the hand-feed chute.

2. A stacker having a hand-feed function according to Claim 1, wherein said sheet guide members are plate members each having an inclined side inclined upward with respect to the direction of delivery of printed cut sheets.

3. A stacker having a hand-feed function according to Claim 1, wherein said sheet guide members are wire members formed by bending a wire and having an inclined section inclined upward with respect to the direction of delivery of printed cut sheets.

- 1 -

4. Printing Apparatus including printing means (3)
an automatic sheet feeder (2) for feeding sheets to the
printing means, and a stacker (1) to receive printed
sheets from the printing means, the stacker including
5 a hand feed chute for individual sheets to be printed,
the chute including a front plate (11) a back plate
(12) and side plates (13), and sheet guide members (17,
18; 42, 43) upstanding from the front plate (11) to
guide a printed sheet outwardly from the front plate,
10 characterised in that a portion of the front plate (11)
is of a shape that defines an opening (16) to
facilitate insertion of hand fed sheets into the hand
feed chute.

Fig. 1 v

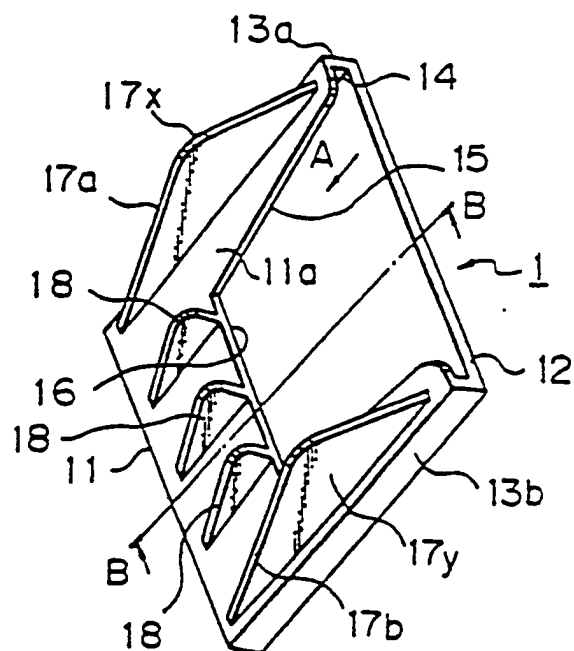


Fig. 2

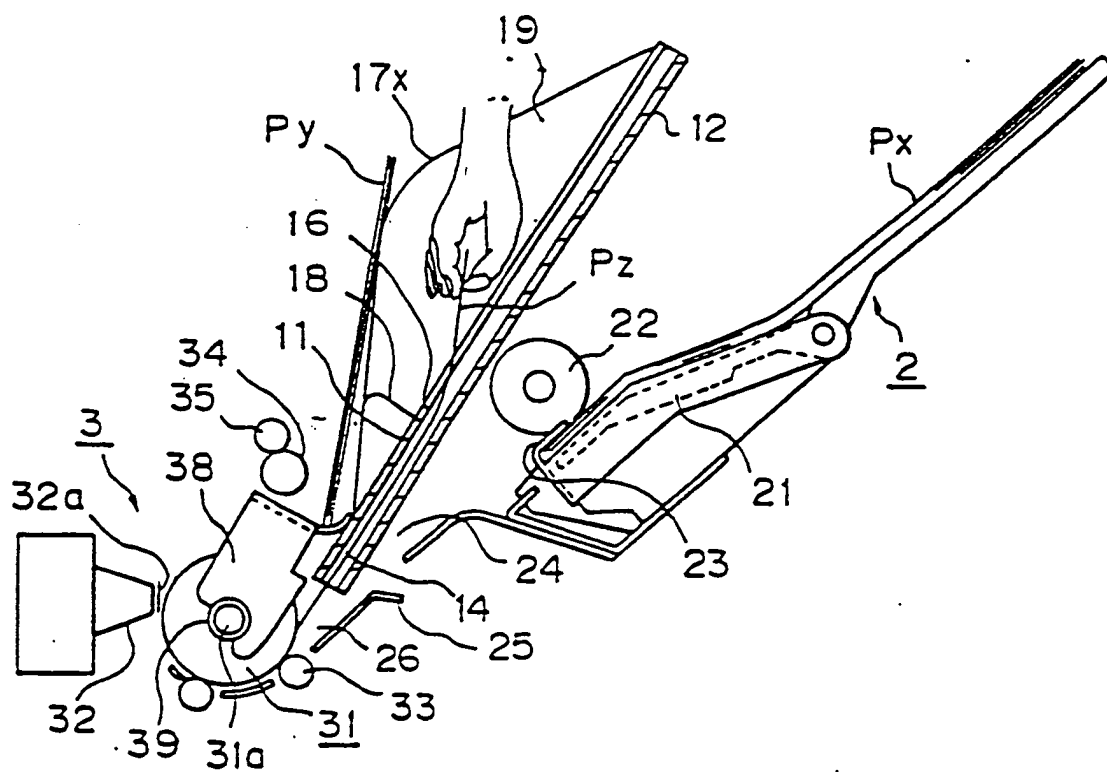


Fig. 3

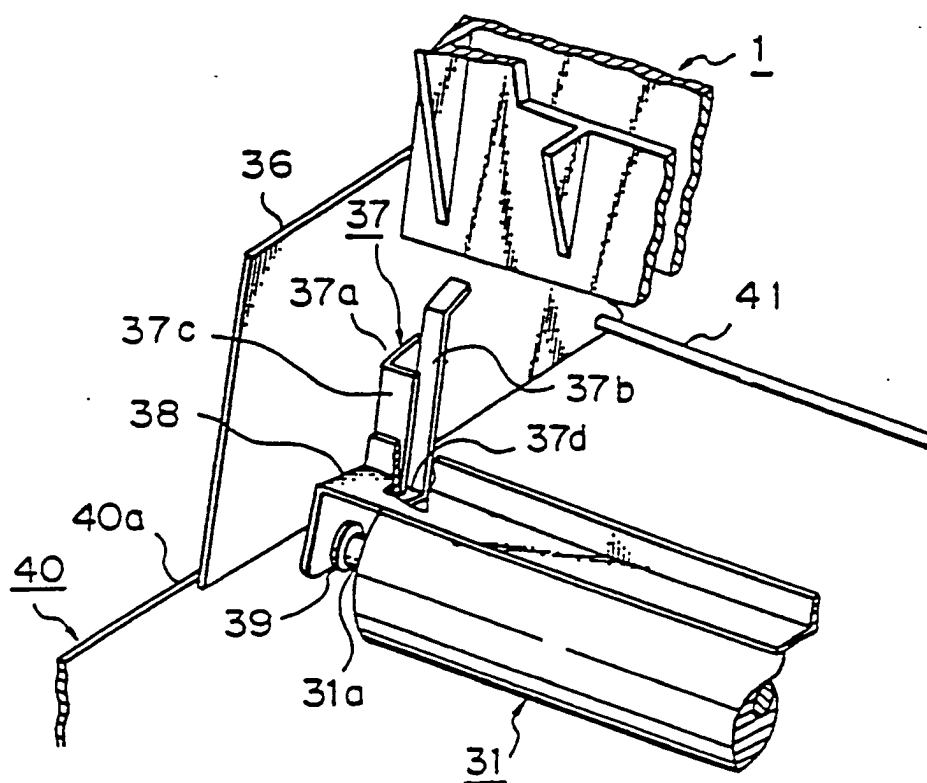
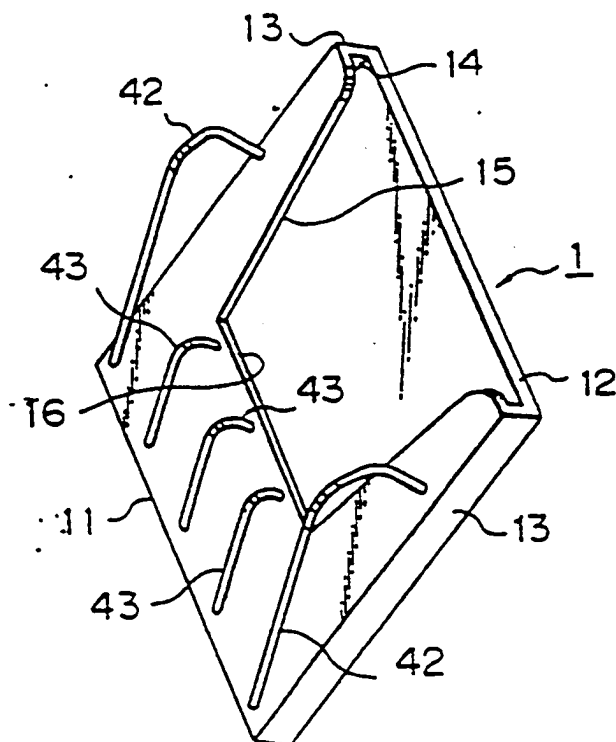


Fig. 4



INTERNATIONAL SEARCH REPORT

International Application No PCT/JP90/00049

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl⁵ B41J13/00, B65H3/44, 11/00, 31/02

II. FIELDS SEARCHED

Minimum Documentation Searched *

Classification System :

Classification Symbols

IPC B41J13/00, B65H3/44, 11/00, 31/02

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched *

Jitsuyo Shinan Koho	1926 - 1989
Kokai Jitsuyo Shinan Koho	1971 - 1989

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	JP, B2, 63-53091 (PFU Co., Ltd.), 21 October 1988 (21. 10. 88), (Family: none)	1 - 3
A	JP, Y2, 62-32864 (USAC Denshi Kogyo Kabushiki Kaisha), 22 August 1987 (22. 08. 87), (Family: none)	1 - 3
A	JP, U, 61-165953 (Oki Electric Industry Co., Ltd.), 15 October 1986 (15. 10. 86), (Family: none)	1 - 3
A	JP, U, 61-95732 (Mita Industrial Co., Ltd.), 20 June 1986 (20. 06. 86), (Family: none)	1 - 3
A	JP, A, 54-138720 (Helmut Steinhilber), 27 October 1979 (27. 10. 79) & DE, B2, 2816448 & US, A, 4,253,652	1 - 3

* Special categories of cited documents: ¹⁰

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

Date of Mailing of this International Search Report

March 20, 1990 (20. 03. 90)

April 2, 1990 (02. 04. 90)

International Searching Authority

Signature of Authorized Officer

Japanese Patent Office